

VIIP 2017 Clinical Update

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Disclosure Information

88th Annual Scientific Meeting

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I have no financial relationships to disclose.

I will not discuss off-label use and/or investigational use
in my presentation.



Spaceflight Associated Neuro-ocular Syndrome (SANS)





BACKGROUND

- 50 ISS expedition missions have been completed (since 2000)
- Sentinel case occurred in 2005
 - Optic disc edema and cotton wool spot
- Surveillance/medical data collection is ongoing and has evolved
 - Began *some* “VIIIP” related testing in 2008 (w/ Exp 18)
 - Inconsistent testing until Feb 2010 (Exp 23) when standardized medical monitoring (i.e., “Eye MED B”) came into effect
- Initial eye/vision testing capability on ISS
 - Ophthalmoscope (astro-physicians only)
 - Paper VA chart
 - Amsler grid
- Eye testing was done pre- and post-flight





Medical Surveillance





Surveillance & Medical Data Collection

Terrestrially

- 3T MRI – Special “NASA Astronaut” protocol 12-18 months prior to launch
- Visual Threshold Perimetry
- Cycloplegic Refraction



Terrestrially & On-Orbit

- Vision Exam
 - Distant Vision Acuity (Acuity Pro on laptop)
 - Near Vision Acuity (handheld card)
 - Amsler grid
- Ocular Ultrasound
- Fundoscopy
- Optical Coherence Tomography (OCT)
- Tonometry (when clinically indicated)





35°

OD

OIS



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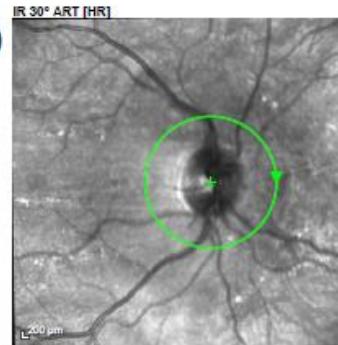
Axonal Single Exam Report OU with FoDi™
SPECTRALIS® Tracking Laser Tomography

Diagnosis: —

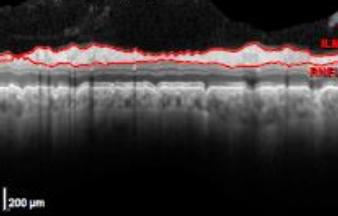
■HEIDELBERG
ENGINEERING■

Comment: —

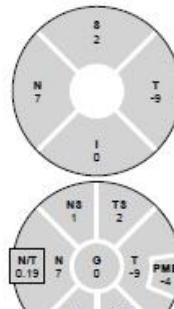
OD



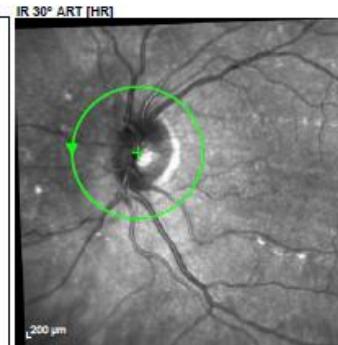
OCT ART (100) Q: 25 [HR]



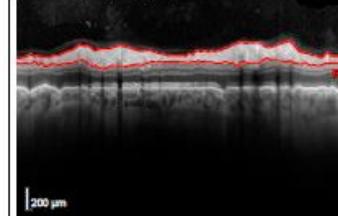
Asymmetry
OD - OS



OS



OCT ART (100) Q: 27 [HR]



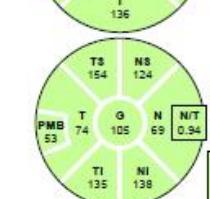
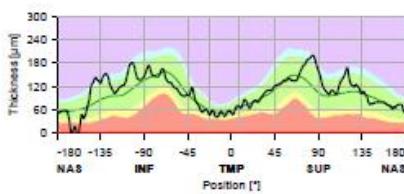
Above Normal Limits (p<0.01)

Borderline Above (p<0.05)

Within Normal Limits (p>0.05)

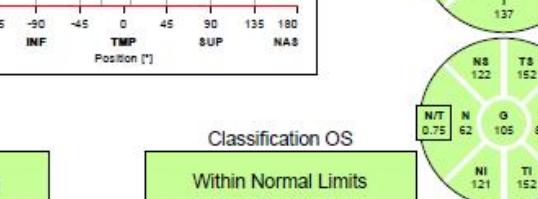
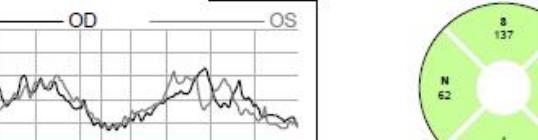
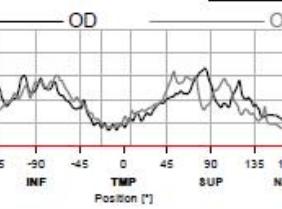
Borderline Below (p>0.05)

Below Normal Limits (p>0.01)



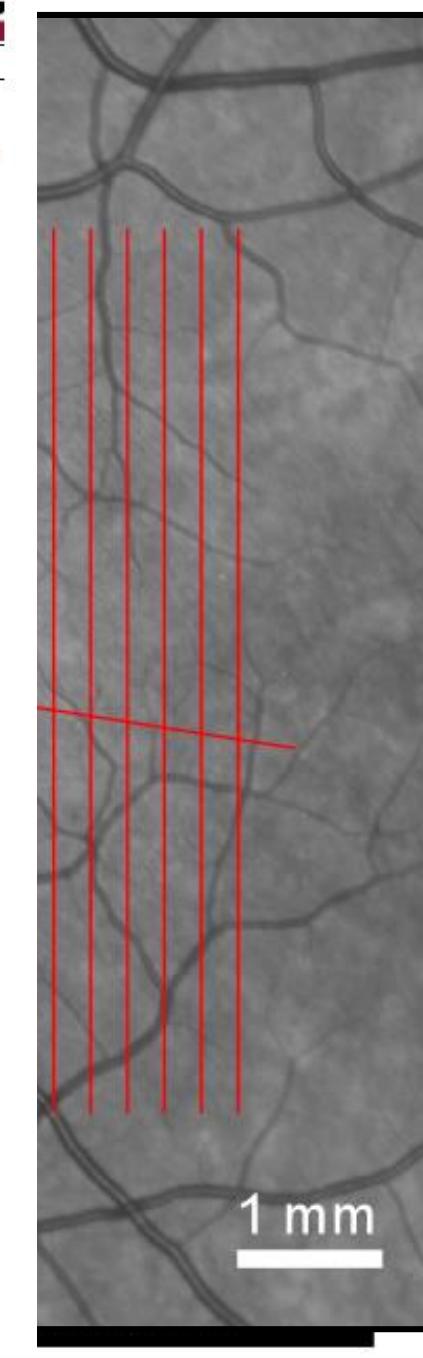
Classification OD

Within Normal Limits



Classification OS

Within Normal Limits



MRI REPORT TEMPLATE

THIS SECTION IS FOR JSC USE ONLY

Order Number: [Click here to enter text.](#)

Purpose of Exam: Choose an item. Mission: [Click here to enter text.](#) Exam Session: Choose an item.

Annual Year: Choose an item.

Indications: [Click here to enter text.](#)

Ordering Provider: [Click here to enter text.](#)

Crewmember Name: [Click here to enter text.](#) DOB: [Click here to enter text.](#)

Gender: [Click here to enter text.](#)

Date of Exam: [Click here to enter a date.](#)

Interpreting Physician: Choose an item. Exam Location: Choose an item.

Activity Type: Choose an item.

Orbit

	Right Eye	Left Eye
Optic Nerve Sheath Diameter	Numeric Entry Diameter (cm)	Numeric Entry Diameter (cm)
	Numeric Entry Percentile	Numeric Entry Percentile
Disc Elevation	Choose an item.	Choose an item.
Globe Flattening	Choose an item.	Choose an item.
ON Tortuosity	Choose an item.	Choose an item.
Incidental Pathology Findings	Comment	

Brain

	Measurement	Comment
Sella configuration	Choose an item.	Description (Dome, Stalk, Herniation, etc.)
Other CSF space (ventricles, sulci, cisterns)	Choose an item.	Click here to enter text.
Dural Sinuses	Combined Stenosis Score	Description (configuration, side dominance, etc.)
Incidental Pathology Findings, Includes UBOs	Comment:	
Other Deviations and Normal Variants	Comment:	

Impression - Rating: Choose an item.

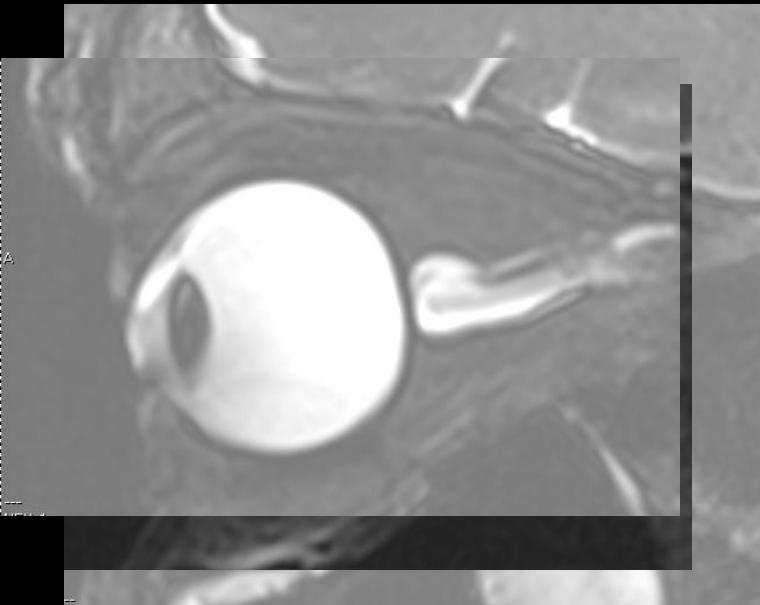
Impression - Comment: [Click here to enter text.](#)

Procedure(s): [Click here to enter text.](#)

Treatment Plan: [Click here to enter text.](#)

Summary of Exam: [Click here to enter text.](#)

MRI



MRI prior to flight

MRI 6 days after landing

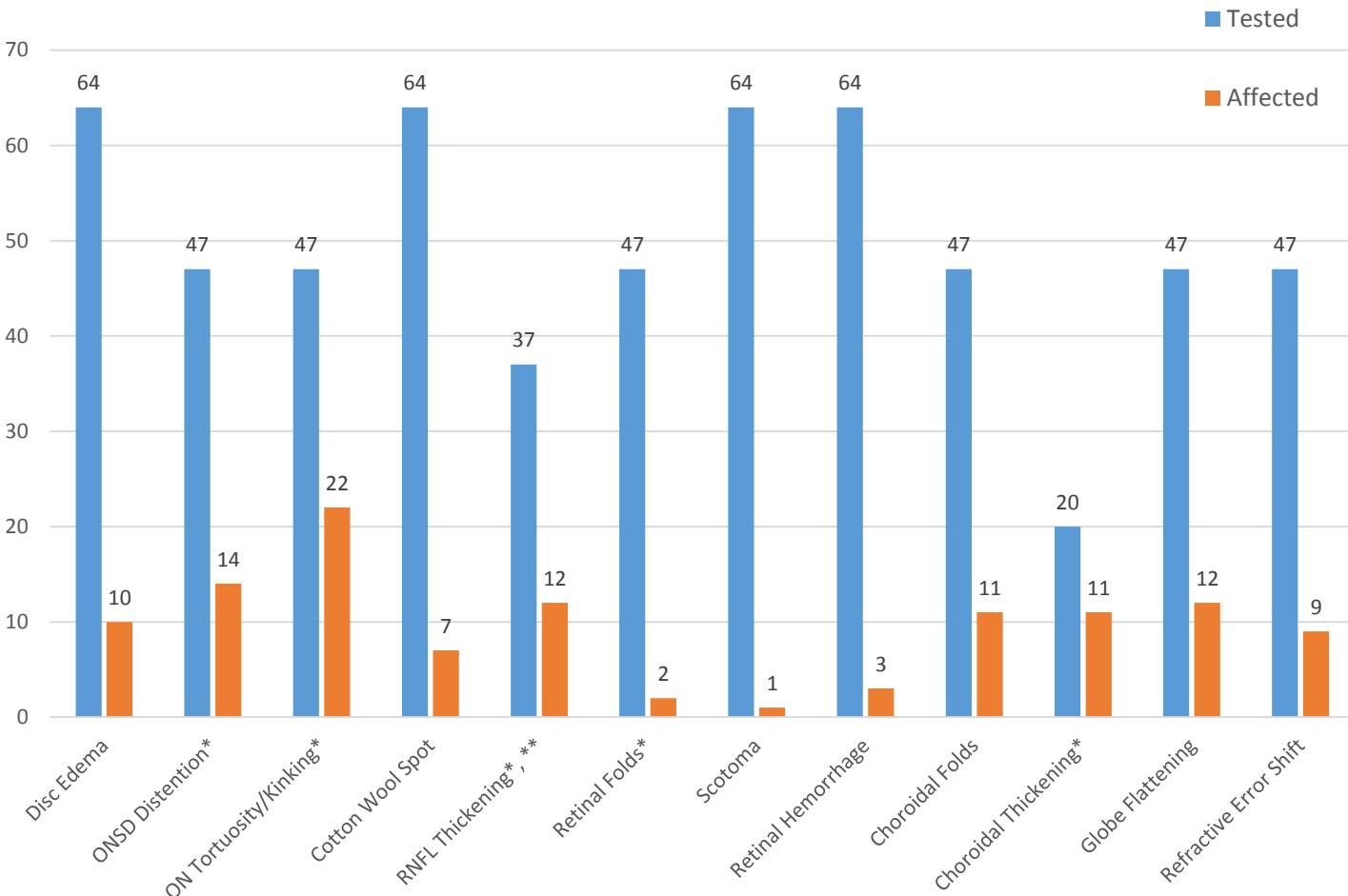
MRI 1 yr post flight



USOS Individuals With Findings:

Expeditions 1-48

40 Individuals have one or more of these findings



Disc Edema = Modified Frisen Scale Grade 1 or greater at first postflight eye exam (fundoscopy)

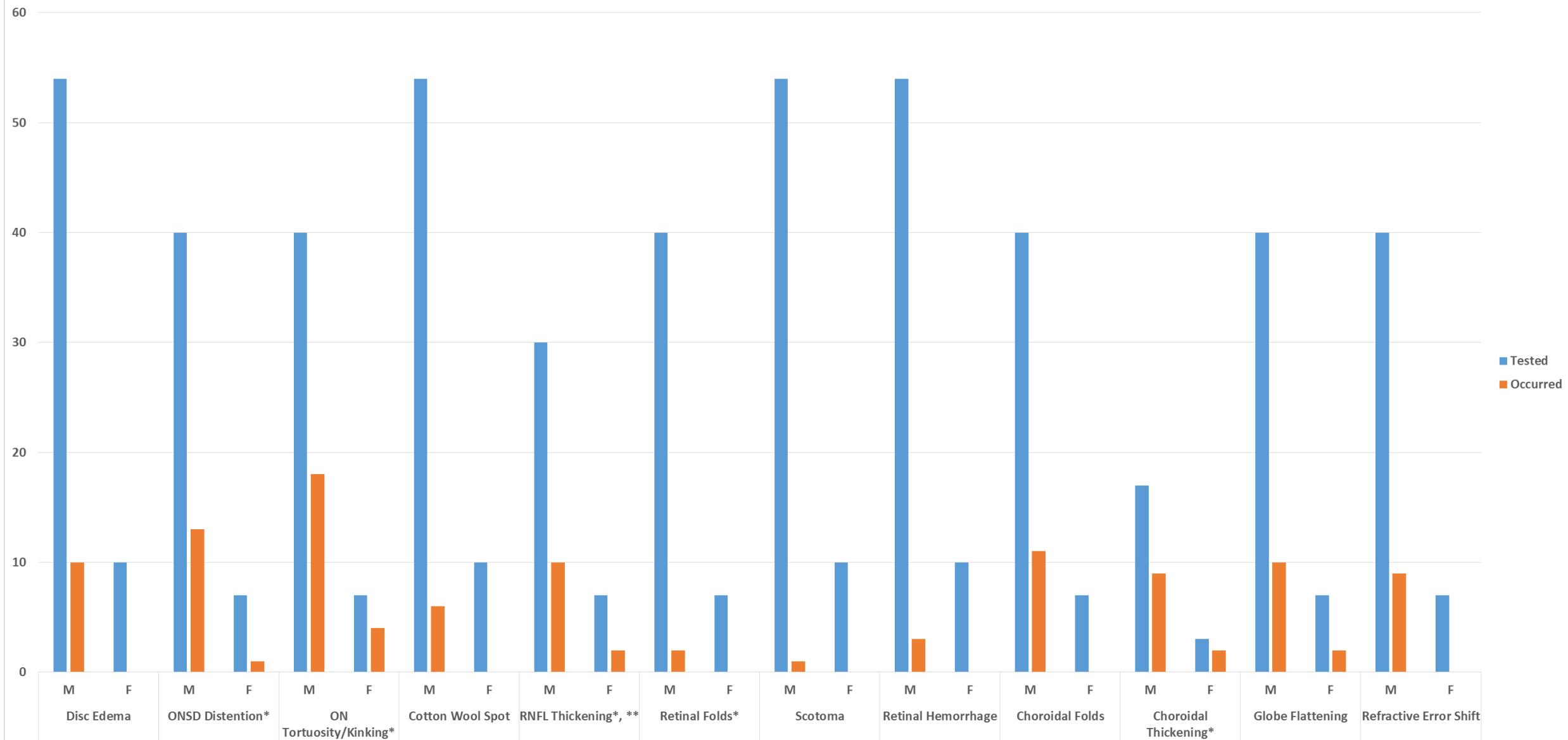
Globe Flattening = significantly changed compared to preflight (MRI)

Choroidal Folds = New or worsened compared to preflight (OCT)

*Preliminary data, precise definition to be determined

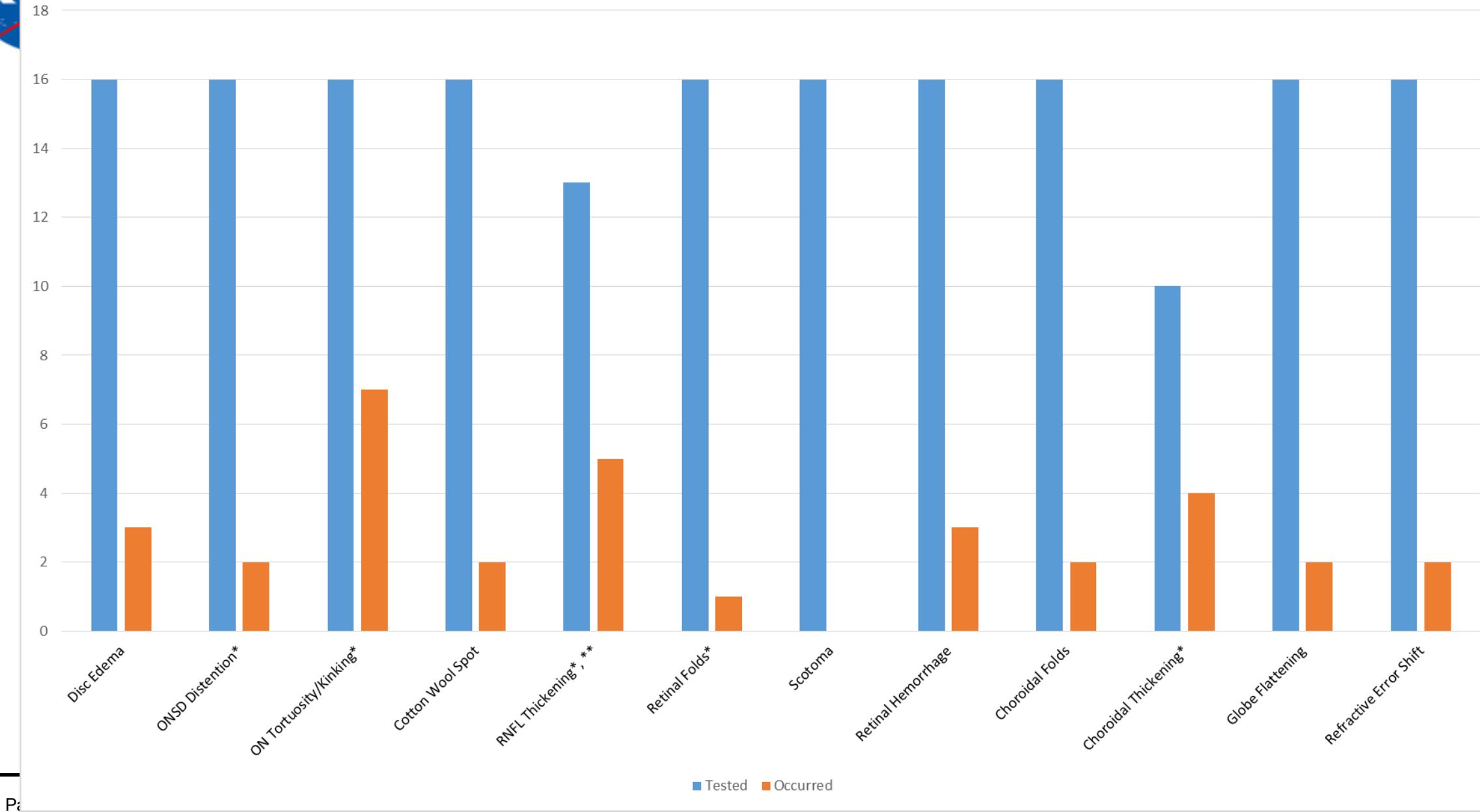
**Does not include disc edema cases

USOS Individuals w/ VIIP Findings by Gender:
Expeditions 1-48





USOS Spaceflight Naive Individuals w/ VIIP Findings: Expeditions 1-48





WHY IS THIS HAPPENING?

- Hypothesis #1
 - Increased intracranial pressure
- Hypothesis #2
 - This is a local eye problem
- Hypothesis #3
 - Slight reduction in IOP and slight increase in ICP
- Hypothesis #4
 - Folate-dependent 1-carbon metabolic pathway may be altered
- Hypothesis #5
 - Venous congestion along with unrelieved high-normal ICP

